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ABSTRACT

Research on hemispheric specialization indicates that the two hemispheres of the brain are specialized to perform different functions. A visual style of thinking is associated with the right hemisphere, while a verbal style is associated with the left hemisphere. The possibility of a relationship between psychological androgyny and sex role stereotyping and the integrated or singular use of these thinking styles was investigated. Undergraduates (N=42) completed the Bem Sex Role Inventory (BSRI) to determine sex role identification and the Hemispheric Preference Test to assess preferred thinking style. Significant correlations were found between the right, spatial-intuitive style of thinking and the masculine sex role. Lower correlations were found between the left, language-sequential style of thinking and the masculine sex role. The spatial-intuitive style of thinking was related to such traits as strong will, analytical thinking, assertiveness, decisiveness, athletic activity, leadership ability, individualism, self-sufficiency, and independence. The findings suggest that the desire to become more masculine may entail development and integration of the spatial-intuitive style of thinking in moderately greater proportion to the language-sequential style of thinking than currently prevails. (Author/NRB)

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The Spatial Style of Thinking and its Relation to the Masculine Sex Role

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Running Head: Spatial Thinking and Masculinity

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The Spatial Style of Thinking and its Relation to the Masculine Sex Role

The differing functions and capacities of the two hemispheres of the brain were considered by Hughlings Jackson as early as 1864. Jackson suggested that the faculty of expression resided in the left hemisphere, and that of perception in the right hemisphere. He based his suppositions on observations of patients who suffered insult to only one cerebral hemisphere (Bogen, 1969).

Research in the field of hemispheric specialization has expanded dramatically over the past two decades. There are clear indications that the two hemispheres of the brain are specialized to perform different functions. Levy-Agresti and Sperry (1968) suggested that a possible reason for this lateralization was the development of language. Language requires processing in a logical, analytical, sequential fashion. Before the development of language, processing was more gestalt oriented, spatial, thinking was in terms of movements and behaviors, and information input was synthesized. This synthetic simultaneous processing allowed for the rapid complex syntheses of perceptions necessary for survival during the primitive period of man's development.

The differential location of these functions in the right and left hemispheres are consistent only for right handed individuals. The response patterns of left-handed individuals are considerably more complex (Hecaem and Ajuriaguerra, 1964; Miller, 1971). The development of two different thinking styles still occurs, however, their attribution to specific hemispheres is only consistent for right handed subjects.

Zenhausern (1978) has proposed a model of hemispheric preference which suggests that individuals tend to favor the thinking style of one hemisphere over the other when processing information. Left hemisphere preferred individuals (lefts) input, store, and retrieve information sequentially which leads to a synthetic or inductive style of reasoning. Right hemisphere preferred individuals (rights) input, store, and retrieve information holistically, synthesizing the information but reasoning deductively. The basic distinction is that rights favor visual stimuli, think in pictures, and have great difficulty thinking without them. Lefts favor auditory stimuli, think in words, and may or may not have imagery accompanying their thoughts. There is evidence which suggests that some people can think in either mode, equivalent to mixed hemispheric preference, however, more research needs to be done in this area (Zenhausern, 1978).

On the basis of this theory Zenhausern has designed a test partially based on Your Style of Learning and Thinking

(Torrence, Reynolds, Ball, and Reigel, 1978), which measures hemispheric preference (Zenhausern and Repetti, Note 1).

The right style of thinking may best be referred to as an intuitive style since thoughts, images, and solutions to problems seem to arise in a non-verbal fashion to which we are unaccustomed. Throughout the rest of this paper the "right" style of thinking, when not specifically related to the right hemisphere as would be the case with left handed subjects, shall be referred to as the "spatial-intuitive" style. Similarly, the left style of thinking, being predominantly concerned with language and sequential reasoning, will be referred to as the "language-sequential" style.

Blakeslee (1980) points out that as the result of a training process which spans childhood individuals come to prefer the use of one hemisphere over the other. The basis of this process is a competitive mechanism whereby one hemisphere overtakes the other. The hemisphere, or style of thinking, most frequently called for takes precedence and increasingly is used to solve a wider variety of tasks; some of which would be more effectively dealt with by the other hemisphere or style of thinking. In this culture the language-sequential style of thinking is the most highly emphasized and rewarded; a fact immediatly evident in our educational system. The spatial-intuitive style of thought is increasingly impoverished.

In a discussion on the importance of utilizing the functions of, and including the right brain in the educational process, Blakeslee (1980) pointed out that it isn't the singular development of the spatial-intuitive style of thinking that is important, but rather the integration of the spatial-intuitive style with the language-sequential style that is most effective.

Dimond and Beaumont (1971) have found that the use of both cerebral hemispheres increases brain capacity. Their research implies that each hemisphere possesses its own perceptual analyzing system. The distribution of the perceptual load between these two parallel conjoint systems is superior to the use of only one.

Further evidence of the advantage of integrated use of the two hemispheres has been presented in a study by Olson (1977). He has found through observation of eye movements that gifted students tend to use both hemispheres of their brain; selecting the hemisphere most appropriate to the task. This is in contrast to normal children who tend to rely only on one hemisphere or problem solving style no matter what the nature of the task is.

In contrast to studies emphasizing the advantage of the integrated use of language-sequential and spatial-intuitive thinking styles several researchers have identified disorders resulting from restricted use of thinking styles or defects in the cerebral hemispheres. Smokler and Shevrin (1979) have

recently published research which correlates a right hemisphere overreliance with hysteria, and a left hemisphere overreliance with obsessive-compulsiveness. Schizophrenia and the affective psychoses, psychotic depression and manic depression, have been related to a differential disturbance in hemispheric functioning by Flor-Henry (1969, 1974), Parisi (Note 1), and others.

As a means of further expanding the concept of hemispheric preference and its implications for personality development it may be useful to determine whether it is related to the concept of psychological androgyny and sex role adaptability.

With the advent of women's rights and the gain in momentum of the women's liberation movement the cultural conceptions of masculinity and femininity have been investigated.

Both Kagan (1964) and Kohlberg (1966) explain that highly sex typed individuals are motivated to keep their behavior consistent with an internalized sex role standard. People accomplish this by suppressing any behaviors that are identified with the opposite sex role and augment those behaviors identified with the desired sex role.

The conception of sex role as a system of bipolar opposites has been extended by Block (1973), Constantinople (1973), and by Bem (1974). These theorists have questioned the tacit assumption that individuals fall at either one or the

other end of the sex role continuum. They suggest that an individual may have both masculine and feminine characteristics and term such an individual psychologically androgynous. They further reason that the androgynous individual would be more flexible than the stereotyped individual and would therefore be able to function more effectively in a wider range of situations. The androgynous individual would be more psychologically healthy and adaptable than the strictly sex typed individual.

Bem (1974) designed a scale to measure psychological androgyny, the Bem Sex Role Inventory (BSRI). Utilizing this scale to classify subjects as masculine, feminine, or androgynous she was able to test androgyny as a desirable characteristic. Two experimental conditions were employed. In one the degree to which subjects conformed under group pressure was assessed; resistence to conformity was considered a masculine trait. In the other experimental condition the freedom with which individuals entered into play with a kitten was assessed; playfulness being a feminine trait. Results showed that androgynous subjects displayed various behavioral deficits with the feminine females showing the greatest deficit of all, they readily conformed and did not demonstrate the capacity for playful interaction (Bem, 1975).

Recent studies seem to throw into doubt the hypothesis that androgynous males and females are significantly more adaptive, flexible, and competent than individuals who are

masculinely sex typed. Heilbrun and Pitman (1979) found that under relatively private conditions the degree of androgyny was positively correlated with sex role flexibility for females but not for males. The opposite result was obtained under social circumstances; androgyny in males was associated with greater flexibility. They concluded however, that flexibility in this case was generally nonadaptive.

Jones, Chernovetz, and Hansson (1978) in an extensive study and reassessment of androgyny have found that masculine males are more competent and confident than androgynous and feminine males. Their findings for females indicate that the more masculine the female subjects were, the more adaptive, competent, and secure they were. Thus, it appears that general adaptability is characterized by such traits as assertiveness, decisiveness, and intellectuality as opposed to nurturance, responsiveness, and emotionality. The former are traits apparently more highly valued by society, and these traits are associated with the masculine sex role. This study also found that androgynous and femininely sex typed males and females desired to become more masculine with the femininely typed individuals most desirous of change.

The research presented above has been shown to link several psychopathological disorders with an overreliance on, or a dysfunction of one or the other hemispheres of the brain. It has also been indicated that the coordinated use of both hemispheres increased the brain's capacity to process infor-

mation. Sex role research has suggested that androgyny leads to greater flesibility while sex-typing leads to restricted functioning. Other research indicates that the characteristics associated with the masculine sex role are most adaptive.

The present study seeks to establish whether there is a relationship between psychological androgyny and visual and verbal styles of thinking associated with right and left cerebral hemispheres respectively. Using Sandra Bem's conception of androgyny as a state of higher flexibility and adaptability it is expected that there will be a significant relationship between the androgyny score of the Bem Sex Role Inventory and the hemispheric preference score of the Hemispheric Preference Test (Zenhausern and Repetti, Note 2). More specifically, it is expected that androgynous individuals will use both visual and verbal styles of thinking and problem solving while masculinely sex typed individuals will prefer the language-sequential style and femininely sex-typed individuals will prefer the spatial-intuitive style of thinking.

This study will also seek to determine whether the feminine sex role is significantly related to the frequency of dream recall and the degree of emotional arousal by dramatic performances.

Method

Subjects

The subjects were drawn from three undergraduate psychology classes at Pace University. Forty two subjects were tested, twenty six were female and sixteen were male. Their ages ranged from seventeen through forty five years; the mean age was twenty three years.

Three groupings of these same subjects were used in the statistical analysis. Since gender influences sex role identification the subjects will be divided into male, N=16, and female, N=26, groups. The third group will be male and female combined, N=42.

Apparatus

A General Information Sheet was used to obtain general demographic and the following information: favorite color, handedness, sinistrality, onset sleeping position, frequency of dream recall, any recurrent health problems, and a ten point self-rating question which assessed the degree to which a subject feels emotionally moved by dramatic performances. This additional information was sought to determine whether it was significantly related to hemispheric preference and sex role. As will be noted, several of the questions were eliminated from the analysis due to a restricted range of answers.

Thinking and problem solving style was measured by the Hemispheric Preference Test (HPT), a self-rating questionnaire developed by Zenhausern and partially based on Your

Style of Learning and Thinking (Torrance, Reynolds, Ball, and Reigel, 1978). Zenhausern and Repetti report that test-retest reliabilities range from .74 to .86. These reliabilities were based on an earlier form which has since been revised (Zenhausern and Repetti, Note 2). The revised form of this test, now called the Hemispheric Preference Test, has been shown to have concurrent and predictive validity in studies by Zenhausern and Gebhardt (1979), Zenhausern and Nickel (1979), Zenhausern and Repetti (Note 3), and Parisi (Note 1). These studies indicate that the HPT has enough reliability and validity to be used as a general screening and classifying instrument of hemispheric preference in right handed subjects, or of thinking style in a right and left handed population. (See Appendix A for the Hemispheric Preference Test).

The HPT is composed of two scales of twenty eight questions each. Subjects rate themselves on a continuum of one to ten for each question. One scale yields a right score and the other a left score. The mean difference between these two scores indicates the degree and direction of hemispheric preference or preferred thinking style.

Three scores were calculated from the HPT. The Mean Left Score was the mean of the sum of all left scale questions. Similarly, the Mean Right Score was calculated for the right scale. The Hemispheric Preference Score was calculated by subtracting the total right score from the total left score and dividing by 28. A negatively valued hemispheric preference

score indicates a larger right score while a positively valued hemispheric preference score indicates a larger left score.

The Bem Sex Role Inventory (BSRI) (Bem, 1974) was used to measure sex role identification. (See Appendix B for the BSRI). The BSRI is a subjective rating questionnaire which has a Masculinity scale, a Femininity scale, and a Social Desirability scale. Each scale is comprised of twenty personality characteristics. Subjects rate themselves along a seven point continuum as to the degree to which these characteristics describe themselves.

Four scores were calculated from the BSRI. Masculinity, Femininity, and Social Desirability scores were gained by calculating the mean score for each scale. An index of androgyny, the Androgyny score, was calculated by subtracting the masculinity score from the femininity score and multiplying the difference by a correction term of 2.322. When classification of individuals by sex role is desired an androgyny score above one indicates a femininely sex typed individual, a score below negative one indicates a masculinely sex typed individual, and a score which falls between positive one and negative one inclusive indicates an androgynous individual.

Procedure

Each of the three classes were tested as groups. After being introduced by the professor the examiner read a set of instructions which described the research as an attempt to see

if different personality characteristics are related to styles of learning and thinking. Subjects were asked to be candid and sincere when answering and it was suggested that they answer according to their first impressions. They were told there were no right or wrong answers and that they should answer according to the way they are, not the way they would like to be. It was explained that all information would be kept confidential through the use of a subject code and they were asked to write the last four digits of their social security number on each questionnaire. Questions were invited at this point. The directions were once again repeated in summary fashion and the subjects were told to place their papers to the corner of their desk when finished. The questionnaires were then passed out. In all cases the General Information Sheet was on top followed in alternating fashion by the BSRI and the HPT. Testing time ranged from 18 to 40 minutes. The questionnaires were collected when all subjects had finished.

Results

On the HPT hemispheric preference scores above zero suggest a preference for the language-sequential style of thinking while scores below zero suggest a preference for the spatial-intuitive style of thinking. Of the sixteen males tested twelve preferred the language-sequential style, three preferred the spatial-intuitive style, and one was evenly mixed. Of the twenty six females tested eighteen preferred the

language-sequential style and eight preferred the spatial-intuitive style.

On the BSRI, of the sixteen males tested, seven were masculinely sex typed, eight were androgynous, and one was oppositely sex typed. Of the twenty six females tested five were masculinely sex typed, eleven were androgynous and ten were femininely sex typed.

Since the mode of statistical analysis was to be correlational all scores were derived as continuous variables. Product-moment correlations for the three groups were computed between the mean right, mean left, hemispheric preference, masculinity, femininity, androgyny, and social desirability scores, gender, handedness, frequency of dream recall, and the degree of emotional arousal by dramatic performances.

An examination of Table 1 shows that the most significant correlations between the HPT and the BSRI scores were found between the mean right, mean left, and masculinity scores. The correlations between the mean right score and the masculinity score were, for male (r=.73, p=.001), female (r=.60, p=.001), and combined (r=.65, p=.001) groups. Significant correlations between the mean left and the masculinity scores for males (r=.54, p=.03), and the combined group (r=.36, p=.02).

A significant correlation was found between the hemispheric preference score and the masculinity score for the female (r=-.41, p=.04) and for the combined group (r=-.41, p=.008).

Insert Table 1 about here

The significant correlations between the androgyny score and the mean right score for the combined group (r=-.53, p=.001), and between the androgyny score and the mean left score for the male group (r=-.56, $p<.05$) and the combined group (r=-.38, $p<.05$) are all negative. This indicates that as the androgyny score decreases, or moves toward the masculine end, mean right and mean left scores tend to increase. Since mean left and mean right scores have already been demonstrated to correlate significantly with the masculinity score, the correlation of these scores with androgyny might be accounted for by thier relationship solely to the masculinity score. It should be noted however, that the male mean right score very closely approaches significant correlation with the femininity score (r=.49, p=.054).

These results suggest there is a relationship between the spatial-intuitive type of thinking style measured by the right scale of the HPT and the personality characteristics typically associated with the masculine sex-role. In order to determine the nature of this relationship product-moment correlations were performed; mean right, mean left, and hemispheric preference scores were run with the masculinity and femininity items of the BSRI. These results are shown on Tables 2 and 3 respectively. The negative correlation between an item and the hemispheric preference score indicates a relationship

between that item and the "right" spatial-intuitive style of thinking. This is true because a negatively valued hemispheric preference score indicates a preference for the spatial-intuitive style of thinking.

The masculine items which correlated significantly with the mean right score were, in order of highest to lowest significance: Willing to take a stand (r=.57, p<.001), Analytical (r=.49, p<.001), Assertive (r=.47, p<.001), Forceful (r=.47, p=.002), Athletic (r=.46, p<.01), Makes decisions easily (r=.44, p<.01), Has leadership abilities (r=.42, p<.01), Acts as a leader (r=.40, p<.01), Individualistic (r=.40, p<.01), Independent (r=.39, p<.05), Willing to take risks (r=.39, p<.05), Defends own beliefs (r=.37, p<.05), Self sufficient (r=.35, p<.05), Competitive (r=.35, p<.05), and Self reliant (r=.32, p<.05).

The masculine items which correlated significantly with the mean left score were, in order of highest to lowest significance: Willing to take a stand (r=.43, p<.01), Analytical (r=.42, p<.01), Assertive (r=.38, p<.05), Forceful (r=.35, p<.05), Willing to take risks (r=.35, p<.05), Acts as a leader (r=.32, p<.05), and Has leadership abilities (r=.30, p<.05).

Insert Table 2 about here

Correlation of mean right, mean left, and hemispheric preference with femininity items did not result in a relevant trend of relationship.

Insert Table 3 about here

Product-moment correlations of the masculinity, femininity, and androgyny scores were performed with: first, the right scale items of the HPT, and second, with the left scale items of the HPT. These results are shown in Tables 4 and 5 respectively. The negative correlation between an item and the androgyny score indicates a relationship between that item and the masculine sex role. This is so because a negatively valued androgyny score indicates endorsement of traits in the direction of the masculine sex role.

The right scale items which correlated significantly with the mean masculinity score were, in order of highest to lowest significance: Ability to grasp elusive and uncertain information (r=.53, p< .001), Ability to think of and do humorous things (r=.52, p< .001), Good at teaching by manipulating objects (r=.50, p< .001), Vividness of dreams (r=.46, p=.002), Artistically creative (r=.43, p=.005), Ability to remember dreams (r=.43, p=.004), Ability to rely on images in remembering and thinking (r=.42, p=.005), Likes dealing with several variables at a time (r=.41, p=.007), Ability to interpret body language (r=.39, p=.011), Likes to keep things fluid and spontaneous (r=.39, p=.01), and Uses metaphores and analogies

(r=.33, p=.03).

Insert Table 4 about here

Right scale items which correlated negatively with the androgyny score, but not directly with the masculinity score were: Likes to use symbols and images when solving problems (r=.36, p=.02) and Likes creative synthesizing reading (r=.34, p=.03).

The left scale items which correlated significantly with the masculinity score were: Likes giving verbal explanations (r=.48 , p=.001), Likes critical and analytical reading (r=.46, p=.002), When involved in a task, how strongly do outside stimuli interfere (r=-.40, p=.008), Good at abstract, as opposed to concrete thinking (r=.39, p=.01), Ability to develop a general concept given basic facts (r=.37, p=.02), and Fluent using words (r=.34, p=.03).

Insert Table 5 about here

Product-moment correlations were run for the Hemispheric Preference Test and Bem Sex Role Inventory scores with the Frequency of Dream Recall and the degree the subject is emotionally moved by dramatic performances. As can be seen from Table 6, Frequency of Dream Recall is related to the mean right score for the male group (r= .77, $p \leq .001$) and the combined group (r= .53, $p \leq .001$). Frequency of dream recall also correlates with the hemispheric preference score for

males (r=-.62, p=.01), females (r=-.47, p=.02), and the combined group (r=-.52, $p \leq .001$). These findings indicate that frequency of dream recall increases in proportion to an individual's use of the "right" spatial-intuitive style of thinking. This same relationship is also noted between the masculine sex role and the frequency of dream recall for the male group (r= .62, p=.01) and the combined group (r=<.42, p=.006).

Emotional arousal by a dramatic performance correlates with the mean right score for the female group (r=.47, p=.02) and the combined group (r=.35, p=.02), and with the mean left score for the female group (r=.40, p=.05) and the combined group (r=.32, p=.04). This suggests that a subjects self-rating of emotional arousal by a dramatic performance increases in proportion to their mean self-rating on the right and left scales of the Hemispheric Preference Test.

Insert Table 6 about here

Discussion

It has been shown that there was a significant relationship between the "right" spatial-intuitive thinking style and the masculine sex role. The spatial-intuitive style of thinking is related to such traits as strong will, analytical thinking, assertiveness, decisiveness, athletic activity, leadership ability, individualism, self-sufficiency, and independence. Several of these items also correlated with the language-

sequential style of thinking, the left scale of the HPT, however, the correlations were lower. The masculine sex role was found to be related to these items from the right scale, the abilities: to grasp elusive and uncertain information; to teach by manipulating objects; to think metaphorically; to be humorous, spontaneous, imaginative, and inventive; to interpret body language; to be artistically creative; and to remember dreams. Comparison of the different traits and abilities from both the right scale of the HPT and the masculinity scale of the BSRI indicates that these scales did not request similar information. A comparison of Tables 2 and 4 will make this immediatly obvious.

As previously noted, Jones, Chernovitz, and Hansson (1978) had determined that general adaptability seemed to be characterized by such masculine traits as assertiveness, decisiveness and intellectuality as opposed to the feminine traits of nurturance, responsiveness, and emotionality. They also found that both males and females who were androgynous or femininely stereotyped preferred to become more masculine. Based on the results of this study the desire to become more masculine, or more adaptable and facile, would entail development and integration of the spatial-intuitive style of thinking in moderatly greater proportion to the language-sequential style of thinking than currently prevails in this culture. This result is counter to that predicted in the opening of this study; i.e., that the language-sequential

style would be highly related to the masculine sex role.

This same line of reasoning can be applied to education. It appears that adaptability may be more highly related to the spatial-intuitive style of thinking than to the language-sequential style. This finding supports Blakeslee's (1980) assertion that inclusion of "right" brain functions into education, and the encouragement of their integration into the individual's personality will result in more capable and effectively functioning students and adults. Curriculum in the schools is currently centered about the language-sequential style; emphasis is placed on reading, writing, and arithmetic with consideration given to further cutbacks in art, music, and athletics. This approach has been taken out of the well intended belief that concentration on verbal skills will prepare the child more completely for life after graduation. The results of this study suggest that success in life is coordinate with an individual's capacity to draw on spatial-intuitive thinking as well as language-sequential thinking. Our educational system may be psychologically castrating students by encouraging them to concentrate solely on learning facts and language skills. Specific knowlege and skills are important, however, individuals must have a practical "feel" for the total situation in which they are to apply their knowlege. This natural "feel" or "sense" for a situation is a function of the spatial-intuitive style of thinking which enables the individual to experience

and respond to the environment in a gestalt fashion, in practical terms of cause and effective. Students currently capable of spatial-intuitive thought may be more successful in terms of creativity, productivity, and interpersonal relations, than the students who receive straight A's based on their abilites to memorize facts and operate with formulas. Such things as humor, spontaneity, artistic creativity, the ability to interpret body language, and the ability to remember dreams are all spatial-intuitive traits which can be directly integrated into curriculum.

It was originally suspected that frequency of dream recall would be correlated with the feminine sex-role. Additional research with a larger population of subjects may reveal this to be partially true for males. Frequency of dream recall appears to be more closely related to the masculine sex-role.

It was suspected that emotional arousal in response to a dramatic performance would be related to the feminine sex role. Statistical analysis of the data did not prove this prediction.

In the absence of significant correlations conclusions as to the relationship between thinking style, androgyny, and the feminine sex role can not be reached.

Additional research of a similar nature is suggested utilizing a larger population of subjects. It is noted that

in this study only three of the sixteen males tested had hemispheric preference scores which were negative. This lack of males who prefer the use of the spatial-intuitive thinking style may have affected results.

Another area of research which deserves further study has to do with handedness. Confusing trends were noted when the subjects were grouped according to handedness. Once again, a larger sample is needed.

P. Pierce Skinner 9-15-80

Pierce Skinner September 1980

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Table 1

Correlation of Spatial, Language, and Preference Scores with Masculinity, Femininity, Androgyny, and Social Desirability Scores

	Masculinity Score	Femininity Score	Androgyny Score	Social Desirability Score
Spatial Score				
Males	.73***	ns	ns	ns
Females	.60***	ns	ns	ns
Combined	.65***	ns	-.53***	.31*
Language Score				
Males	.54*	ns	-.56*	ns
Females	ns	ns	ns	ns
Combined	.36*	ns	-.38*	.34*
Preference Score				
Males	ns	ns	ns	ns
Females	-.41*	ns	ns	ns
Combined	-.41**	ns	ns	ns

*p ≤ .05 Males N=16
**p ≤ .01 Females N=26
***p ≤ .001 Combined N=42

Table 2

Correlation of Spatial, Language, and Preference Scores With Masculinity Items of the Bem Sex Role Inventory

Items	Spatial Score	Language Score	Preference Score
1. Self reliant	.32*	ns	ns
4. Defends own beliefs	.37*	ns	-.49***
7. Independent	.39*	ns	ns
10. Athletic	.46**	ns	-.37*
13. Assertive	.47***	.38*	ns
16. Strong Personality	ns	ns	ns
19. Forceful	.47**	.35*	ns
22. Analytical	.49***	.42**	ns
25. Has leadership abilities	.42**	.30*	ns
28. Willing to take risks	.39*	.35*	ns
31. Makes decisions easily	.44**	ns	-.33*
34. Self sufficient	.35*	ns	ns
37. Dominant	ns	ns	ns
40. Masculine	ns	ns	ns
43. Willing to take a stand	.57***	.43**	ns
46. Aggressive	ns	ns	ns
49. Acts as a leader	.40**	.32*	ns
52. Individualistic	.40**	ns	-.35*
55. Competitive	.35*	ns	ns
58. Ambitious	ns	ns	ns

*$p \leq .05$
**$p \leq .01$
***$p \leq .001$

Combined Group: N=42

Table 3

Correlation of Spatial, Language, and Preference Score With Femininity Items of the Bem Sex Role Inventory

Items	Spatial Score	Language Score	Preference Score
2. Yielding	ns	ns	ns
5. Cheerful	ns	ns	ns
8. Shy	-.38*	ns	ns
11. Affectionate	ns	ns	ns
14. Flatterable	ns	ns	ns
17. Loyal	ns	ns	ns
20. Feminine	ns	ns	ns
23. Sympathetic	ns	ns	ns
26. Sensitive to others	ns	ns	ns
29. Understanding	ns	ns	ns
32. Compassionate	ns	ns	ns
35. Eager to sooth hurt feelings	ns	-.35*	ns
38. Soft spoken	ns	ns	ns
41. Warm	ns	ns	ns
44. Tender	ns	ns	ns
47. Gullible	ns	ns	ns
50. Childlike	ns	ns	ns
53. Does not use harsh language	ns	ns	.31*
56. Loves children	ns	ns	ns
59. Gentle.	ns	ns	ns

*$p \leq .05$ Combined group: N=42

Table 4

Correlation of Masculinity, Femininity, and Androgyny Scores with Spatial Scale Items[a]

Combined Group N=42 Items	Masculinity Score	Femininity Score	Androgyny Score
4. Are you good at interpreting body language?	.39**	ns	-.32*
5. Ability to think of and do humorous things?	.52***	ns	-.30*
7. Do you use metaphors and analogies?	.33*	-.35*	-.50***
8. Do you like using symbols in solving problems?	ns	ns	-.36*
9. Are you good at teaching by manipulating objects?	.50***	ns	ns
12. Artistically creative?	.43**	ns	-.37*
19. Remember dreams often?	.43**	ns	-.46**
20. How vivid are your dreams?	.46**	ns	-.54***
26. Ability to rely on images in remembering and thinking.	.42**	ns	ns
34. Like dealing with several variables at a time?	.41**	ns	ns
39. Like to keep things fluid and spontaneous?	.39*	ns	-.34*
45. Good grasp of uncertain and elusive information?	.53***	ns	-.47**
48. Do you like creative, synthesizing reading?	ns	ns	-.34**

(a) Only items with significant correlations are reported here.

*$p \leq .05$
**$p \leq .01$
***$p \leq .001$

Table 5

Correlation of Masculinity, Femininity, and Androgyny Scores With Language Scale Items[a]

Combined Group N=42 Items	Masculinity Score	Femininity Score	Androgyny Score
3. When involved in a task, how strongly do outside stimuli interfere?	-.40**	ns	.41**
21. Are you fluent using words?	.34*	ns	ns
22. Are you good at abstract rather than concrete thinking?	.39**	ns	-.37*
29. Given basic facts, how good are you at developing a general concept?	.37*	ns	ns
37. Do you like working with proper materials, using them as intended for.	ns	-.36*	ns
47. Do you like critical, analytical reading?	.46**	ns	-.56***
56. Do you like giving verbal explanations?	.48***	ns	-.42**

(a) Only those items with significant correlations are reported here.

*$p \leq .05$
**$p \leq .01$
***$p \leq .001$

Table 6

Correlation of Spatial, Language, Preference, Masculinity, Femininity, and Androgyny Scores With Frequency of Dream Recall and Emotionally Moved Scores

	Frequency[(a)] of Dream Recall	Emotionally Moved by Dramatic Performance
Spatial Score		
Males	.77***	ns
Females	ns	.47*
Combined	.53***	.35*
Language Score		
Males	ns	ns
Females	ns	.40*
Combined	ns	.32*
Preference Score		
Males	-.62*	ns
Females	-.47*	ns
Combined	-.52***	ns
Masculinity Score		
Males	.62*	ns
Females	ns	ns
Combined	.42	ns
Femininity Score		
Males	ns	ns
Females	ns	ns
Combined	ns	ns
Androgyny Score		
Males	ns	ns
Females	ns	ns
Combined	-.35	ns

*p < .05
**p < .01
***p < .001
Males N=16
Females N=26
Combined N=42

(a) 1. Never recall dreams
2. Less than once every two weeks
3. About once a week
4. About twice a week
5. Every other night
6. Every night

Table 7

Listing of Spatial and Masculine Items:
Ordered According to Decreasing Strength of Relationship

Spatial Items With Masculinity Score		Masculinity Items With Spatial Score	
45. Good grasp of uncertain and elusive information.	(.53***)	43. Willing to take a stand.	(.57***)
5. Ability to think of and do humorous things.	(.52***)	22. Analytical.	(.49***)
9. Good at teaching by manipulating objects.	(.50***)	13. Assertive.	(.47***)
20. Vivid dreams.	(.46**)	19. Forceful.	(.47**)
12. Artistically creative.	(.43**)	10. Athletic.	(.46**)
19. Remember dreams often.	(.43**)	31. Makes decisions easily.	(.44**)
26. Rely on images in remembering and thinking.	(.42**)	25. Has leadership abilities.	(.42**)
34. Like dealing with several variables at a time.	(.41**)	49. Acts as a leader.	(.40**)
4. Good at interpreting body language.	(.39**)	52. Individualistic.	(.40**)
39. Like to keep things fluid and spontaneous.	(.39*)	7. Independent.	(.39*)
7. Use of metaphors and analogies.	(.33*)	28. Willing to take risks.	(.39*)
		4. Defends own beliefs.	(.37*)
		34. Self-sufficient.	(.35*)
		55. Competitive.	(.35*)
		1. Self-reliant.	(.32*)

*p < .05
**p < .01
***p < .001

Combined Group: N=42

Appendix A

Hemispheric Preference Test

1. Listing of Right Scale questions.
2. Listing of Left Scale questions.

Right Hemispheric preference questions.

4. Are you good in interpreting body language?
5. How good is your ability to think of humorous things to say and do?
6. Are you psychic?
7. Do you use metaphors and analogies?
8. Do you like using symbols or images in solving problems?
9. How good are you at teaching or explaining by manipulating objects?
11. How good is your sense of direction?
12. Are you artistically creative?
16. How vivid are your daydreams?
19. Do you remember dreams often?
20. How vivid are your dreams?
24. How good is your ability to understand kinesthetic instructions (movement and action)?
26. How good is your ability to rely on images in remembering and thinking?
27. Do you use a playful approach to solving problems?
30. Given a major concept, how good is your ability to derive simpler concepts from it?
32. When you hear a name, how good are you at imagining the appropriate face?
34. Do you like dealing with several problems or variables simultaneously?
36. How good is your ability in taking open-ended tests which have no single "right" answer?
38. How good is your ability to use whatever is available even if it is not the best material to get work done?
39. Do you like to keep things open, fluid, spontaneous?
42. Do you like to think or read lying down?
43. Are you responsive to emotional appeals?
45. How well can you grasp elusive and uncertain information?
48. Do you like creative, synthesizing reading?

Right continued

49. Do you like solving problems by trial and error?
52. How often does your thinking consist of mental pictures or images?
54. How well do you understand visual or kinesthetic instructions?
55. Do you like teaching or explaining by visual presentation?

Left Hemispheric preference questions.

1. How good is your ability to control your feelings and emotions?
2. How often are your decisions based on objective facts, rather than your feelings?
3. When you are involved in a task, how strongly do outside stimuli (noise, talking, music, etc.) interfere?
10. Do you like talking or writing?
13. Are you logical?
14. How good are you at solving crossword puzzles?
15. How quickly can you read?
17. Do you enjoy work that requires the use of words?
21. Are you fluent in using words?
22. How good are you at abstract, rather than concrete, thinking?
23. How well do you understand verbal instructions?
25. How good is your ability to rely on verbal memory in remembering and thinking?
28. Do you use a serious, all business approach to solving problems?
29. Given basic facts, how good are you in developing a general concept?
31. When you see a face, how easily can you remember the name that goes with it?
33. Do you like dealing with one problem or variable at a time?
35. How good is your ability in taking multiple choice tests?
37. Do you like working with proper materials, using things for what they are intended to be used for?
40. Do you like experiences to be planned and structured?
41. Do you like to think or read while sitting upright?
44. Are you responsive to logical verbal appeals?
46. How well do you grasp well established, certain information?
47. Do you like critical and analytical reading?
50. Do you like working out problems in your head?
51. How often does your thinking consist of words?
53. How well do you understand verbal instructions?
56. Do you like giving verbal explanations?
18. How good is your ability to think of synonyms for words?

Appendix B

Bem Sex Role Inventory

1. Listing of Masculine and Feminine items.

Characteristics of Masculine and Feminine Sex Roles as determined by 100 (50 male, 50 female) Stanford U. Undergraduates. Students rated these characteristics as being significantly more desirable for the corresponding biological sex.

Masculine	Feminine
Acts as a leader	Affectionate
Aggressive	Cheerful
Ambitious	Childlike
Analytical	Compassionate
Assertive	Does not use harsh language
Athletic	Eager to soothe hurt feelings
Competitive	Feminine
Defends own beliefs	Flatterable
Dominant	Gentle
Forceful	Gullible
Has leadership abilities	Loves children
Independent	Loyal
Individualistic	Sensitive to the needs of others
Makes decisions easily	Shy
Masculine	Soft spoken
Self-reliant	Sympathetic
Self-sufficient	Tender
Strong personality	Understanding
Willing to take a stand	Warm
Willing to take risks	Yielding

"According to both Kagan (1964) and Kohlberg (1966), the highly sex-typed individual is motivated to keep his behavior consistent with an internalized sex-role standard, a goal that he presumably accomplishes by suppressing any behavior that might be considered undesirable or inappropriate for his sex. Thus, whereas a narrowly feminine self-concept might inhibit behaviors that are stereotyped as masculine, a mixed, or androgynous, self-concept might allow an individual to freely engage in both 'masculine' and 'feminine' behaviors." (Sandra Bem, "The Measurement of Psychological Androgyny," Journal of Consulting and Clinical Psychology, 1974, Vol 42, No 2, 155-162.)